

Check-List, Distribution and Habitat in Bulgarian Centipedes

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ABSTRACT

This preliminary survey of the Bulgarian centipede fauna is based on bibliographic data, collections and recent material examined by the author. The present check-list includes 26 species of Geophilomorpha, 5 species of Scolopendromorpha, 67 species of Lithobiomorpha and 1 species of Scutigleromorpha. Subspecies are not listed because of their uncertain status. The district and altitudinal distribution of the centipedes is shown in Table 1. 42% of all the species recorded in the country are Bulgarian or Balkan endemics. Most endemic species are known from Rhodopi Mts. (37%) and Strandza Mts. (35%). Some species (*Thracophilus bulgaricus* Verhoeff, *T. beroni* Matic & Darabantzu) show the connections between the Bulgarian (respectively Balkan) fauna with that of Asia Minor.

RÉSUMÉ

Les Chilopodes de Bulgarie : liste des espèces, répartition et habitat.

Cet inventaire préliminaire de la faune des chilopodes de Bulgarie est basé sur les données de la littérature, sur les collections existantes et sur du matériel récemment analysé par l'auteur. La liste des espèces inclut 26 Geophilomorpha, 5 Scolopendromorpha, 67 Lithobiomorpha et 1 Scutigleromorpha. Les sous-espèces ne sont pas prises en considération à cause du caractère trop incertain de leur statut. L'aire de répartition et la distribution verticale sont données par le Tableau 1. 42% de toutes les espèces répertoriées sont des endémiques de Bulgarie ou des Balkans. Le plus grand nombre d'espèces endémiques se trouve dans les Monts Rhodope (37%) et dans les Monts Strandza (35%). Certaines espèces (telles *Thracophilus bulgaricus* Verhoeff et *T. beroni* Matic & Darabantu) montrent l'existence de connexions entre la faune bulgare (et balkanique) et celle de l'Asie Mineure.

INTRODUCTION

The formation of the present day Bulgarian centipede fauna can be generally divided into three historical periods: Tertiary, Pleistocene and Postglacial (GRUEV, 1981). At the end of the Miocene and at the beginning of the Pliocene, the tropical and subtropical climate in South Europe and in the Balkan peninsula changed to more temperate conditions. At the same time Bulgaria fell under the influence of the Central European fauna from the north and Asiatic fauna from the north-east.

The second main period in the formation of the Bulgarian centipede fauna began during the Pleistocene, when North America, Europe and Siberia were covered with an ice belt. Under the influence of this cold spell, the climate changed in the Balkan peninsula (including Bulgaria).

The glaciation enveloped the high Bulgarian Ryla and Pirin mountains. In the lower southern mountains: Strandza, Sakar and the eastern parts of the Rhodopi Mts., the influence of the cold spell was on a lesser scale. Many species of Chilopoda have found here more favourable conditions.

TAXONOMIC OBSERVATIONS

Contributions to the study of the centipedes (Chilopoda) of Bulgaria have been made by several authors (JURINICH, 1904; VERHOEFF, 1926-1928; FOLKMANOVA, 1936; MATIC, 1964-1973b; MATIC & DARABANTU, 1968; MATIC & GOLEMANSKY, 1964-1967c; NEGREA, 1965, 1971; KACZMAREK, 1969a, 1975; RIBAROV, 1984-1992). In 1936, FOLKMANOVA recorded the species *Scolopendra morsitans* (L.) from Strandza Mts., Southeastern Bulgaria. During the period 1980-1984, the present author collected numerous specimens of the genus *Scolopendra* in Southeastern Bulgaria and examined them. On the base of this and the examination of the collections of Chilopoda in the Natural History Museum, Sofia, RIBAROV (1984) considered that probably FOLKMANOVA (1936) has wrongly identified some specimens of *S. cingulata* Latreille as *S. morsitans* and in fact the last species does not occur in Bulgaria. On the other hand, RIBAROV (1989a) identified the subspecies *S. cingulata thracia* Verhoeff as a new synonym of *S. cingulata*. The lithobiomorphs *Eupolybothrus grossipes* (C. L. Koch) and *Lithobius borisi* (Verhoeff) were also removed from the Bulgarian faunal list (RIBAROV, 1989a). The first one as misidentified by JURINICH (1904) and the second as a new synonym of *Lithobius erythrocephalus* (C. L. Koch).

In the present paper, subspecies are not listed because of their uncertain status. There are some cases of different subspecies of the same species which reported from the same locality. Such are: *Cryptops anomalans anomalans* Newport and *C. a. schassburgensis* Verhoeff, *C. parisi parisi* Brolemann and *C. p. rhenanus* Verhoeff. The taxonomic status of the subspecies *Pachymerium ferrugineum insulanum* Verhoeff also needs an examination. The description of the specimens of *P. f. insulanum* Verhoeff, announced by KACZMAREK (1969a) from the Bulgarian Black Sea coast show significant differences (more various than those peculiar for the subspecies level) with the nominate form *P. f. ferrugineum* C. L. Koch recorded in the same region (RIBAROV, 1984-1990).

ZOOGEOGRAPHICAL DISTRIBUTION AND HABITAT

To clarify the distribution of the centipedes and their habitat preferences, the Bulgarian territory is divided here into 7 regions, on the basis of climatic-geographic principles: 1 - Black Sea coast (BSC), 2 - North Bulgaria (NB), 3 - Thracean region (TR), 4 - Central mountains (CM), 5 - Southwestern region (SW), 6 - Ryla-Rhodopi region (RR) and 7 - Strandza Mts. (SM) (Fig.1). The check-list and distribution are presented in Table 1.

The western, higher and more humid parts of the Rhodopi Mts. were included in RR, but the eastern lower and more arid parts of the same Mts. remains in TR.

42% of all the centipedes established in the country are Bulgarian or Balkan endemics. Comparing the regions, the largest percentage of endemics is found in the Strandza Mts.(35%) and in Ryla-Rhodopi region (32%). Somewhat larger is the respective percentage in the Rhodopi Mts. which fall into neighbouring regions - RR and TR (Fig.1). Some of the Bulgarian endemic species: *Geophilus balcanicus* Kaczmarek, *Lithobius electron* Verhoeff, *L. glaciei* Verhoeff, *L. rylaicus* Verhoeff, *L. jurinici* Matic & Golemansky, are recorded only from the high parts of the mountains of the Ryla, Pirin, Stara Planina range and W-Rhodopi. Probably the above mentioned species belong to isolated communities of an older Euro-Siberian faunistic complex. On the other hand, in the East-Rhodopi, Sakar Mts. and Strandza Mts. (2/3 of the last extend south into Turkey), many thermophilic endemic species have evolved and survived. Such are: *Henia angelovi* Ribarov, *Lithobius maculipes* Folkmanova, *L. tiasnatensis* Matic, *L. thracicus*

Matic & Golemansky, *L. golemanskyi* Ribarov, *L. strandzanicus* Ribarov, *Harpolithobius folkmanovae* Kaczmarek.



FIG. 1. — Zoogeographical regions in Bulgaria. 1 - Black Sea coast (BSC), 2 - North Bulgaria (NB), 3 - Thracean region (TR), 4 - Central mountains (CM), 5 - Southwestern region (SW), 6 - Rila-Rhodopi region (RR), 7 - Strandza mountains (SM).

27% of all Bulgarian centipedes belong to European and Central European faunistic elements, but their percentage is not the same in the different regions. In North Bulgaria, these species are 40% and in the Central Mts. 35%. This percentage is smaller in the Strandza Mts. (32%) and in the Southwestern region (32%). The more thermophilic South European, South-East European and Central-South European faunal patterns established in Bulgaria are 14%; the Mediterranean - 11%. The highest percentage of Mediterranean faunistic elements were recorded from the Black Sea coast (26%) and from the Southwestern region (20%). This is connected with the climatic influence and with the location of the two above mentioned regions in the path of Mediterranean migrants. The number of Mediterranean species occurring in the Strandza Mts. and in the Thracean region is also high. In spite of this, their percentage is respectively 16% and 14%, because of the numerous endemic species occurring in the same regions.

The thermophilic endemic species *Thracophilus bulgaricus* Verhoeff and *T. beroni* Matic & Darabantu seem to be good indicators of the connections between the Balkan and the Asia Minor fauna in Bulgaria. The endemics *T. cilicus* Attems and *T. pachypus* Verhoeff are representatives of the genus *Thracophilus* Verhoeff in Asia Minor according to ZAPPAROLI (1990).

Some of the thermophilic species distributed south of the Central Bulgarian mountains prefer more humid biotopes rich in vegetation: *Harpolithobius folkmanovae* Kaczmarek, *Lithobius beroni* Negrea, *Pleuroolithobius jonicus* (Silvestri). Other taxa such as *Henia angelovi* Ribarov and *Lithobius peregrinus* Latzel occur in more arid and open sites.

TABLE 1. — Present knowledge of the centipede fauna (Chilopoda) of Bulgaria - Distribution according to the regions (BSC-Black Sea coast, NB - North Bulgaria, TR - Thracean region, CM-Central Mts., SW - Southwestern region, RR - Ryla-Rhodopi region, SM-Strandza Mts.) - Vertical distribution (V.D.) m a.s.l.; Zoogeographic distribution (Z.D.): en - Endemic, ben - Balkan endemic, il - Illiric, me - Mediterranean, eme - East Mediterranean, se - South European, see - South-East European, cse - Central-South European, e - European, ce - Central European, t-e-me - Turano-Euro-Mediterranean, e-a - Euro-Asiatic, co - Cosmopolitan.

Distribution Species	BSC	NB	TR	CM	SW	RR	SM	V. D.	Z.D.
GEOPHILOMORPHA									
<i>Bothriogaster signata</i> Attems, 1926				+				150	eme
<i>Brachyschendyla varnensis</i> Kaczmarek, 1968	+							100	en
<i>Clinopodes flavidus</i> C. L. Koch, 1847	+	+	+	+	+	+	+	0-2100	e-a
<i>Dignathodon microcephalum</i> (Lucas, 1846)	+		+	+				0- 700	me
<i>Geophilus balcanicus</i> Kaczmarek, 1972						+	+	1300-1400	en
<i>G. electricus</i> (L., 1758)	+							100	e
<i>G. flavus</i> (De Geer, 1783)	+		+	+	+		+	50-1000	e
<i>G. linearis</i> C. L. Koch, 1835			+	+	+	+	+	150-2500	e
<i>G. proximus</i> C. L. Koch, 1847			+	+				250- 600	e
<i>G. rhodopensis</i> Kaczmarek, 1970			+			+	+	150-1800	en
<i>G. strictus</i> Latzel, 1880					+			400- 500	ben
<i>Henia angelovi</i> Ribarov, 1987			+	+			+	150- 700	en
<i>H. bicarinata</i> (Meinert, 1870)				+	+			250- 600	me
<i>H. illyrica</i> (Meinert, 1870)	+	+	+	+	+	+	+	0-1600	il
<i>Himantarium gabrielis</i> (L., 1767)	+		+		+		+	0-1450	me
<i>Pachymerium ferrugineum</i> C. L. Koch, 1835	+		+	+		+	+	0-1100	t-e-me
<i>P. flavum</i> Folkmanova, 1949	+		+	+		+	+	0- 700	ce
<i>Schendyla delicatula</i> Kaczmarek, 1969	+							100	en
<i>S. montana</i> Attems, 1895			+	+				500-1300	cse
<i>S. nemorensis</i> (C. L. Koch, 1836)						+		550	e
<i>S. walachica</i> Verhoeff, 1900						+		600- 700	ben
<i>Strigamia acuminata</i> (Leach, 1815)			+	+		+		150-1000	e
<i>S. crassipes</i> (C. L. Koch, 1835)	+	+	+	+		+	+	0-2400	e
<i>S. transsylvanica</i> (Verhoeff, 1928)	+		+	+		+	+	0-1800	il
<i>Thracophilus beroni</i> Matic & Darabantu, 1973						+		450	en
<i>T. bulgaricus</i> Verhoeff, 1926			+			+		500- 800	see
SCOLOPENDROMORPHA									
<i>Cryptops anomalans</i> Newport, 1844	+		+	+	+	+	+	0-1800	e
<i>C. croaticus</i> Verhoeff, 1931	+	+	+	+	+	+	+	0-1800	eme
<i>C. hortensis</i> Leach, 1815	+			+	+	+		400-2000	e
<i>C. parisi</i> Brolemann, 1920		+	+	+	+	+	+	150-1850	e
<i>Scolopendra cingulata</i> Latreille, 1829	+	+	+		+		+	0-1100	me
LITHOBIOMORPHA									
<i>Eupolybothrus andreevi</i> Matic, 1964				+				600	en
<i>E. fasciatus</i> (Newport, 1845)	+	+	+	+	+	+	+	0-1100	se
<i>E. ochraceus</i> (Folkmanova, 1936)		+		+	+	+		100-2350	en
<i>E. transsylvanicus</i> (Latzel, 1882)			+	+	+	+		150-1800	see
<i>E. tridentinus</i> (Fanzago, 1874)	+		+	+	+	+	+	150-1600	cse
<i>E. valkanovi</i> Kaczmarek, 1973						+		600	en
<i>Harpolithobius anodus</i> (Latzel, 1880)		+		+	+	+		500-1650	see
<i>H. aseni</i> Kaczmarek, 1975						+		600	en

<i>H. banaticus</i> Matic, 1961						+		1450	ben
<i>H. folkmanovae</i> Kaczmarek, 1975	+		+		+		+	50- 500	en
<i>H. hemusi</i> Kaczmarek, 1975				+				900	en
<i>H. radui</i> Matic, 1955		+						250	ben
<i>Lithobius aeruginosus</i> L. Koch, 1862		+					+	300-1000	e
<i>L. agilis</i> C. L. Koch, 1847				+				300	e
<i>L. audax</i> Meinert, 1872			+					200- 300	see
<i>L. balcanicus</i> Matic, 1973							+	700- 800	en
<i>L. beschkovi</i> Matic & Golemansky, 1967				+				200- 400	en
<i>L. bifidus</i> Matic, 1973							+	150- 400	en
<i>L. bulgaricus</i> Verhoeff, 1925	+		+	+		+	+	0-1800	ben
<i>L. burzenlandicus</i> Verhoeff, 1931	+	+	+	+		+	+	0- 700	e
<i>L. catascaphius</i> Verhoeff, 1937							+	700	me
<i>L. christovici</i> Matic & Golemansky, 1964			+				+	400- 500	en
<i>L. crassipes</i> L. Koch, 1862	+	+	+	+	+	+	+	0-1100	e
<i>L. curtipes</i> C. L. Koch, 1847			+	+		+		400- 700	see
<i>L. dalmaticus</i> Latzel, 1880				+				800- 900	ben
<i>L. diampolisi</i> Ribarov, 1987			+				+	100- 400	en
<i>L. dobrogicus</i> Matic, 1962			+			+		200- 600	ben
<i>L. duboscqui</i> Brölemann, 1896	+			+		+		700-1900	eme
<i>L. electron</i> Verhoeff, 1927							+	2300	en
<i>L. erythrocephalus</i> C. L. Koch, 1847		+	+	+		+		100-2750	e
<i>L. forficatus</i> (L., 1758)	+	+	+	+	+	+	+	0-2500	e
<i>L. glaciei</i> Verhoeff, 1927				+				2200	en
<i>L. golemanskyi</i> Ribarov, 1987	+		+	+			+	150- 600	en
<i>L. jurinici</i> Matic & Golemansky, 1965						+		900-1900	en
<i>L. lakatnicensis</i> Verhoeff, 1926				+	+	+	+	250-1000	ben
<i>L. lapidicola</i> Meinert, 1872							+	700- 800	e
<i>L. latro</i> Meinert, 1872			+	+				150- 600	se
<i>L. lucifugus</i> L. Koch, 1862	+		+	+		+	+	0- 800	ce
<i>L. maculipes</i> Folkmanova, 1936							+	150- 400	en
<i>L. microps</i> Meinert, 1868		+	+					150- 400	e
<i>L. mutabilis</i> L. Koch, 1862				+		+		600- 800	ce
<i>L. muticus</i> C. L. Koch, 1847		+	+	+		+	+	100-1400	e
<i>L. nigrifrons</i> Latzel & Haase, 1880			+					100- 700	e
<i>L. nigripalpis</i> L. Koch, 1867	+		+	+		+	+	0-1800	me
<i>L. oglednicus</i> Ribarov, 1987				+			+	150- 400	en
<i>L. parietum</i> Verhoeff, 1899	+	+	+	+		+		100-2500	see
<i>L. pelidnus</i> Haase, 1880					+			300	e
<i>L. peregrinus</i> Latzel, 1880				+		+	+	150- 700	see
<i>L. piceus</i> L. Koch, 1862			+	+		+	+	200-1800	ce
<i>L. popovi</i> Matic, 1973				+				900	en
<i>L. proximus</i> Matic & Golemansky, 1967						+		600- 800	en
<i>L. pusillus</i> Latzel, 1880						+		700-1400	ce
<i>L. pustulatus</i> Matic, 1964	+						+	150- 400	ben
<i>L. ruschovensis</i> Matic, 1967						+		800	en
<i>L. rylaicus</i> Verhoeff, 1937						+		2500	cse
<i>L. strandzanicus</i> Ribarov, 1987							+	150- 400	en
<i>L. beroni</i> Negrea, 1965	+		+	+		+	+	150-1300	en
<i>L. thracicus</i> Matic & Golemansky, 1967			+					200	en
<i>L. tiasnatensis</i> Matic, 1973			+					300	en

<i>L. totevi</i> Kaczmarek, 1975				+				1000	en
<i>L. trebinjanus</i> Verhoeff, 1900				?		?		?	see
<i>L. tricuspis</i> Meinert, 1872				+				400- 500	ce
<i>L. uniunguis</i> Matic & Golemansky, 1967							+	200- 800	en
<i>L. viriatus</i> Sselivanoff, 1879				+	+	+	+	150- 2100	see
<i>L. vizicae</i> Ribarov, 1987							+	150- 400	en
<i>L. zelazovae</i> Kaczmarek, 1975			+		+		+	250- 1500	en
<i>Pleurolithobius jonicus</i> (Silvestri, 1896)	+			+	+		+	50- 600	eme
<i>Lamycetes fulvicornis</i> Meinert, 1868				+		+		150- 400	co
SCUTIGEROMORPHA									
<i>Scutigera coleoptrata</i> (L., 1758)	+	+	+	+			+	0- 800	me

CONCLUSION

The present knowledge of the centipede fauna of Bulgaria is obviously incomplete, for that reason, we suggest the present account has to be considered as a preliminary one. For instance, more data is necessary to complete the faunal list for North Bulgaria. Some species of *Lithobius* found in the Rhodopi Mts. are new for science and still in process of description. On the other hand, the taxonomic status of some subspecies and also species is of questionable validity.

From a zoogeographical point of view, the Bulgarian centipede fauna is very rich because of the geological history, the relief and the crossroad situation of the country. Here are distributed: Endemic, Central and South European, Holomediterranean and East Mediterranean, Euro-Asiatic and Balkan-Asia Minor zoogeographical faunistic elements.

The Bulgarian territory can be considered as a refuge for many species which survived the glacial periods. Moreover, the process of specification took place here in some geographically isolated populations. 42.4% of the species established in the country are Bulgarian or Balkan endemics. For the thermophilic species, the most important refuge from the Tertiary times up to now have been the mountains Strandza, Sakar and eastern parts of the Rhodopi Mts., for the Euro-Siberian patterns similarly the mountains of the Ryla, Pirin and Stara Planina range.

A considerable influence on the formation of the modern centipede fauna in Bulgaria was the migrations of the different faunistic elements. The most intensive pathways for the Mediterranean migrants from south to north across the Bulgarian territory have been the Black Sea coast and the valleys of the rivers Struma, Mesta, Toundztha, Maritsa and Arda.

The Central Bulgarian Mts. (Stara Planina range, Sredna Gora range, Vitosha) seemed to have played a role as a natural northern boundary for the thermophilic Mediterranean and South European centipedes such as *Dignathodon microcephalum* (Lucas), *Eupolybothrus tridentinus* (Fanzago) and *Pleurolithobius jonicus* (Silvestri), and one of the last locations for the Central European and Euro-Siberian elements, e. g. *Lithobius mutabilis* L. Koch which have migrated to the south.

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